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Role of a Polyphenol-Rich Dietary Pattern in the Modulation of Intestinal Permeability in Older Subjects: The MaPLE Study †

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1. Introduction

The inevitable rise of the proportion of people aged >65 years worldwide is paralleled by an increased burden of chronic diseases often associated with low-grade systemic inflammation. Recent findings suggest a link between inflammation and intestinal permeability (IP), a condition characterized by an impairment of intestinal barrier function which enables the translocation of dietary and bacterial factors into the blood activating the host immune system [1,2]. Dietary components can be significant modulators of inflammation and IP, and can also affect the intestinal microbial ecosystem. In the context of a diet-microbiota-IP axis in older subjects, dietary bioactives such as polyphenols may play a significant protective role due to their widely reported antioxidant and immunomodulatory properties and potential to regulate IP [3–6].

2. Material and Methods

The MaPLE project involves a multidisciplinary approach developed to ascertain the impact of a polyphenol-rich dietary pattern on a large number of markers in a target group of older subjects living in a controlled setting (i.e., nursing home).

A controlled, randomized cross-over dietary intervention study (8-week polyphenol-rich diet versus 8-week control diet) was undertaken. Markers of IP, inflammation, oxidative stress and vascular function and assessments of gut microbiota structure and function were quantified in serum,

urine and/or fecal samples. In addition, bacterial DNAemia, and serum/urine metabolomics were assessed. In vivo with a dietary mixture similar to the human study and in vitro studies with isolated polyphenols were carried out to investigate mechanisms of action.

3. Results & Discussion

The dietary intervention has been completed and as expected, IP was relatively high in this cohort of older participants, as assessed by serum levels of zonulin at baseline. Quantification of changes in various markers in response to the high polyphenol diet compared to the normal polyphenol diet are being completed and will provide evidence of the putative beneficial effect of increased polyphenol consumption in this target population.

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